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Editor
U. Baliol Scott

Deputy Editor
A. Graham Thomson

Assistant Editor
R. Bowran

Assistant Financial Editor
R. A. Nuttall

Display Advertisement Manager
E. S. Hooper

Circulation
Robert Budd

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Directors
E. Baliol Scott (*Chairman*)
U. Baliol Scott (*Managing*)
G. A. Baliol Scott
R. A. Ellefsen

15 WILSON STREET,
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Sharing the Burden of Aid

AFTER years of scarcity, the Free World has entered upon a period of abundant raw material supplies, in which production capacity for most metals and minerals has overtaken demand. There is one commodity, however, which threatens to become increasingly inadequate for Free World needs, namely capital, and this, unfortunately, is not a shortage that can be overcome by such physical measures as opening up new deposits or building larger, faster printing presses. All indications point to growing pressure on available sources of capital as the tempo of economic development is further accelerated. Due to the immense sums involved, as well as to the highly selective nature of private investment, the task of providing capital for the development projects of " have-not " nations devolves upon the governments of the wealthier countries, whether by direct loans or grants or through the medium of international agencies such as the World Bank.

Since the war the United States has been the universal provider of financial assistance for the economic development of Free World countries, supported only by Britain which, in the words of Sir Roger Makins, Permanent Secretary to the Treasury, has consistently lent abroad to the safe limit of her capacity. The past year, however, has witnessed a further deterioration in the U.S. balance of payments situation, as well as an increase in the economic and monetary strength of Western Europe. In round figures there is a gap of $4,500,000,000 between what the U.S. earns abroad and what it spends. Exports of ordinary goods and services roughly pay for imports at present rates; in fact, if military equipment is included, there is a current surplus of about $3,000,000,000 a year. Against this, the U.S. is paying out about $7,500,000,000, of which $3,000,000,000 is in military aid, $2,500,000,000 in Government loans and grants, and $2,000,000,000 in private capital investment.

In the circumstances it is scarcely surprising that Uncle Sam should be displaying increasing reluctance to continue indefinitely in the role of rich uncle without more effective assistance from countries in a position to shoulder more of the burden.

At the annual meeting of the World Bank and the International Monetary Fund in Washington last week, Mr. Robert B. Anderson, secretary of the United States Treasury, gave a blunt warning that the U.S. might have to tighten up its international policies unless other industrial nations were prepared to assist the dollar both by increasing their own expenditure on economic aid to under-developed countries and by removing their discrimination against U.S. goods. Mr. Anderson did not specify what the U.S. might do. There appears to be no likelihood at present that the Administration would recommend a cut in foreign aid, which President Eisenhower regards as a major weapon in the cold war. It is known, however, that the U.S. Government is considering the stipulation that foreign aid cash be spent only on U.S. goods. Additionally, the government could attempt to slow down imports and provide less encouragement for American firms to invest abroad. All these measures would help to protect the dollar, which has now become a major objective of U.S. policy.

Much the less harmful approach to the problem, from the standpoint of international trade, would be elimination of the present discrimination against dollar goods, which was introduced by Western European countries during a period of economic and financial weakness, but can scarcely be regarded any longer as justified. The United Kingdom, in accordance with the decisions taken at the Montreal Conference, has already gone a considerable distance in liberalising dollar exports.

The International Monetary Fund is now stepping up its efforts to promote international trade by eliminating discrimination. This could bring considerable benefits to the mining industry. Apart from the fact that expansion of international trade must lead to a corresponding increase in consumption of metals and minerals, it is difficult to see how the United States could retain the existing quota restrictions on lead and zinc if other countries were prepared to open up their own domestic markets to dollar goods.

Among the most important developments arising from the Washington meetings was the proposed establishment of an International Development Association to make capital available to under-developed areas on less onerous terms than those of other world institutions. The I.D.A. is seen partly as a means by which America can lessen the burden on its own foreign aid bill and persuade the countries of Western Europe to participate in financing world economic development. The United States has offered to contribute $320,000,000 to the total initial capital of $1,000,000,000, while Britain is to provide $140,000,000.

It is generally agreed that, apart from helping to spread the burden more widely, the I.D.A. will fill a real gap in the existing machinery for economic aid. There seems to be some danger, however, that if finance is available on easy terms, borrowing countries will have less incentive to meet the requirements for obtaining loans at commercial rates. Pitfalls are also seen in the proposals that loans should be repayable, in whole or in part, in the currency of the borrower, and also that use might be made of the local currencies apparently (if surprisingly) obtained by the U.S. in return for farm surplus disposals. The U.S. is reported to have the equivalent of $1,300,000,000 in this form.

If foreign aid is going to develop on a widening front it will become increasingly important to ensure that the money loaned to developing countries is spent with the maximum effect and minimum waste. It would indeed be disastrous if this realistic attitude were not adopted by the proposed new agency. Particularly welcome, therefore, is the proposal that the I.D.A. should be placed under the management of such a highly successful undertaking as the World Bank, which virtually insists on a running technical audit of the use of its loans by ensuring that competent consultants are retained throughout the project.

It will also be apparent that, if the proposed establishment of the International Development Association really means that foreign aid is to become increasingly a Western international effort rather than a U.S. effort, the competition for supplying the know-how and capital goods which backward areas will wish to purchase with these funds will be intensified. Assuming that the U.S. Administration is going to show an increasing insistence on aid with strings, European countries can hardly be blamed for adopting a similar attitude so far as their own contributions are concerned. Hence it will become a matter of increasing urgency that in Britain, the one country where there is virtually no continuing liaison between Government initiative in making foreign aid available and the private enterprise supply of know-how and capital equipment, steps should be taken to set up the necessary machinery for ensuring that to the fullest possible extent trade will follow the flag of aid.

CENTRALIZING ISRAEL'S DEVELOPMENT

After the conclusion of a two-week session of the Israel Technological Advisory Board, the chairman, Sir Ben Lockspeiser, declared at a press conference that the various development companies of the country might be made even more profitable and effective if they were grouped under one " roof " body, much on the lines adopted by the large American corporations with their wholly-owned subsidiaries. Such a central company would raise capital for its specific divisions and direct the inter-flow of products from one to the other, thus, for example, placing the wastes from one plant as the raw material at the disposal of another of its enterprises.

In the meantime, the Board recommended that representatives of the various companies serviced by Israel Mining Industries should delegate members to the board of Israel Mining Industries, while scientific staff from the producing companies concerned be seconded to the laboratories of Israel Mining Industries when occasion arose. The problem of trained engineering staff should not be ignored in view of the continuous expansion of mining activities.

Special mention in the Board's report was made of the future development of the Manara iron ore deposits. The main obstacle in regard to the completion of the survey work, still under way, is the lack of funds. This—it is suggested—may be overcome through the enterprise of " Koor " Industries & Crafts Co. Ltd. which has undertaken to use Manara iron ores in a 50-50 mixture in its 200,000 ton annual ore smelting programme. The other 100,000 tons would be imported from abroad.

THE OUTLOOK FOR WEST GERMAN MINING

West Germany's main mineral product is, as it always has been, hard coal. Whole industrial areas live from coal mining, and so the coal slump which has hit the country in the past eighteen months has been the cause of much social and political unrest. The number of mineworkers employed on the Ruhr had fallen by the end of August by ten per cent from that registered in April of last year. In a typical recent working week 120,568 man-shifts were lost on the Ruhr from short-time working, involving a total loss of 186,700 tonnes of coal and a loss in mineworkers' pay of some £241,700.

Mineworkers have staged protest marches and demonstrations on the Ruhr and in Bonn. Even the emergency tax of £2 10s. per tonne levied by the Government on coal's main competitor — fuel oil — will not, according to the Government's own admission, stop further redundancy, writes our Correspondent, and by 1961 there will be between 80,000 and 100,000 mineworkers fewer in West Germany. Stocks of unsold coal continue to accumulate and will do so for the near future at least. By this June some 11,300,000 tonnes were dumped in West Germany — 33 per cent more than in January of this year despite cuts in output of 5.4 per cent and of imports of 40 per cent. General growth for the whole European Coal and Steel Community's stocks over the same period was one of 29 per cent.

Contrasting with this black picture, however, is the fact that things are in many ways looking up in the German coal industry. Virtually all mineworkers who have lost their jobs have been rehabilitated and are receiving generous Government help, which it is hoped will soon be consolidated from European Coal and Steel Community funds. A few days ago came signs of an agreed crisis policy for submission to the Community's executive by Federal and State Governments, the West German mineworkers' representatives and the employers, even though other claims of the miners

are still outstanding — such as the lowering of the age limit for mineworkers — and as yet the union has shown no signs of calling off its anti-Government propaganda and demonstrations. Productivity in West Germany's pits, now the highest in Europe, reached 1,891 kg. per man-shift by July, as against averages of 1,633 kg. for last year and 1,583 kg. for 1957. The iron and steel industry — coal's main customer — is recovering quickly and definitely from its recent recession. Sales of hard coal are improving in spite of everything ; in the first six months of this year they totalled 45,900,000 tonnes as compared with sales of 45,600,000 tonnes for the same period of 1958. Both main competitors, oil and imported coal, are being restrained from harming the industry over-much by Government action. The country's largest coal-mining group, Krupp of Essen, is to enter into a large-scale rationalisation plan which will include the merger of all main mining companies, and this is expected to have an effect on production. The country's brown coal industry, although well below East German standards, reports a good year despite large East German imports.

That is the other side of the Federal German coal picture. It is certain that the country's main mineral industry is nothing like out of the wood. At least as far as production cuts, short-time working and unsold stocks go, things will get worse before they get better.

During this summer the main event on the industrial programme was the reunification of Federal Germany and the Saar. Monthly coal output of this area, since the war an economic part of France, is around 1,320,000 tonnes, though unsold stocks stand relatively high at 1,460,000 tonnes. Saarbergwerke, the area's coal-mining concern, is at present meeting a deal of criticism from German buyers as its prices went up for certain qualities with the changeover from francs to marks — to a degree that customers say is much too large.

Iron ore output in Federal Germany is improving with the improvement in the iron and steel industry (estimated 1959 raw steel production in the country is the record total of 25,000,000 tonnes as against 22,800,000 tonnes last year and 24,500,000 tonnes for 1957, the previous record year), although some concerns had to cut production by 20 per cent as recently as the second quarter of this year. One of West Germany's main producers, however, the Erzbergbau Salzgitter AG, of Salzgitter, reports growing ore sales ; in the case of this particular company they had by mid-summer of this year risen by almost 10 per cent on January levels. Main development in the iron ore field was the participation of the country's two major steel groups — Krupp and Haniel — in the building of a £1,400,000 four-quay ore harbour in Rotterdam. This harbour, run by the Rotterdam company N. V. Stuwadoors Mij. Kruwal, has the remarkable capacity of 5,000,000 tonnes of ore.

Total outputs from all sources of the major metals in West Germany last year have now been announced. They are, with 1957 production in brackets : aluminium, 225,000 (230,000) tonnes ; lead, 189,900 (199,000) tonnes ; zinc, 202,000 (210,000) tonnes ; copper, 268,000 (253,000) tonnes ; and tin 1,900 (2,100) tonnes. Only in copper, therefore, did output increase over the year. Imports of ores and concentrates fell correspondingly, and in the first quarter of this year were lower by 1.3 per cent than in the same period of 1958. Bauxite output is reported to be keeping more or less to the 1957 annual level of 4,700 tonnes, which itself was below the 1956 total.

According to statements made at the annual meeting of the country's metal-working and metal-mining association which has just come to an end in Lindau, the price fall for lead and zinc had been troubling the country's mining concerns since 1957. Profits on production had fallen by 40 per cent within the West Germany mining industry, which was seeking to cover its losses by transferring to more economic production sites and by various rationalization measures. Some nine mines and processing plants had been closed in the lead-zinc industry and a large-scale fully mechanized open-cast production site brought into operation. Productivity per man-shift had risen by 33 per cent on 1937 levels. The lead-zinc industry was being helped by the Government by certain tax concessions to further the smelting of lead and zinc concentrates in a simultaneous process. The fact that the Soviet Union might well become a zinc importer soon despite high native output could aid Germany.

Gold production fell heavily last year as compared with 1957 — from 1,972 kg. to 1,252 kg. Among the other precious metals mined in Western Germany, 278,059 (267,763) kg. of silver were produced last year, along with 24.9 (32.1) kg. of platinum and 37.4 (34.1) kg. of palladium.

The first uranium mine in the country has come into operation on the borders of the Saar with a daily ore capacity of 50 tonnes and an anticipated monthly pure uranium production of 1 tonne ; it is being considered whether use can be made of the large quantities of resultant slag.

IRON ORE FROM COPPER SLAG

Reference was made in our last week's issue, p. 310, in commenting upon the growing dependence of the American steel industry on foreign iron ores, to the unpredictable factor in any assessment of the future supply position, which is presented by technological progress leading to the economic development of low-grade ores.

Now comes the news that a new company has been formed in the United States to construct and operate the first integrated steel plant in Arizona, which will recover iron from the waste slag of an abandoned copper smelter and convert it into steel, using the Strategic-Udy process, which appears to be rapidly finding a widening field of applications. This now well-known process is a direct reduction method of extracting iron and other metals from a variety of ores. Its economic significance is that for the first time relatively small integrated steel plants can be built in any part of the world where high grade ores are not available.

It is claimed that the application of the process to the numerous slag piles accumulated over many years at Western copper smelters will increase the U.S. domestic iron resources by over 100,000,000 tons. The 30,000,000 ton slag pile at the old United Verde smelter, Clarksdale, Arizona, where the first application is under consideration, contains 33 per cent iron, 0.5 per cent copper, and 2.0 per cent zinc. The objective would be to convert the iron content to steel products and at the same time to reclaim the copper and zinc, as well as to convert the slag from the new process to insulation and light-weight aggregates. The proposed Clarksdale mill would be of 500 tons daily capacity and it is estimated that it would cost over $15,000,000 and would be in operation in about two years. No construction contracts have yet been placed, however, and much depends on the possibilities of a low-cost power contract or cheap natural gas. In other respects, steel plant costs are estimated to be competitive.

It is further reported that the company concerned has contracted to purchase 40,000,000 tons of slag at Anaconda, Montana, from the Anaconda company. This slag will be resold to the steel company. Anaconda operates an active mine and smelter at this location, thus assuring a continuing supply of slag. In addition to the slag pile, the new plant will be able to use hot slag as it is received from the smelter, eliminating a step in the recovery process.

The Professional Training of Technologist

THE extractive industries (i.e., those which win a mineral or other commodity from the earth's crust) include mining, and in its broadest sense "mining" might be allowed to embrace these industries, but generally, certain large and indeed important aspects are not considered to be mining in the normally accepted sense. I refer to quarrying, an industry of very considerable economic importance.

It seems strange that the working of an open pit producing an "ore" is termed a mining operation, whereas the same excavation producing a commodity such as roadstone is called a quarry. Again, a sand deposit worked by a drag line, or even hydraulically excavated, is never considered to be mining, but if the same deposit contains tin or other valuable mineral which has to be recovered, the operation is normally considered to be one of mining.

It would appear, therefore, that to qualify for inclusion as a mining operation, there must be an element of mineral dressing in the operation. To me this is illogical, and the whole field of extractive and mineral industries should be considered as one.

According to the ruling of the Institution of Mining and Metallurgy (1955), it is considered that, having regard to current usage, *ore* should be defined as "a solid, naturally occurring mineral aggregate of economic interest, from which one or more valuable constituents may be recovered by treatment . . . Such natural substances as limestone and fuels are generally referred to by their own names, and would not normally be termed *ore*." This definition is a much wider one than that found in the Oxford Dictionary, and has been adopted in view of the widening of the field of mineral extraction from the earth's crust.

The word "mine" is also difficult to define, since the legal definition is "where working underground by artificial light", and to add to the confusion, one can "mine" a rock which is not an ore. Surely, therefore, and with due consideration to the importance of allied technologies at the present day, it is better to think in terms of technologies in the extractive and mineral industries, rather than in the narrower context of "mining engineering," and to modify both our training and the requirements and object of the professional bodies accordingly.

This trend has been followed at a number of mining schools in the United States, many of whom have dropped the use of the term mining in the more general sense, and replaced it with the term mineral engineering. This not only covers the extractive industries, but embraces geology and metallurgy, which need specialised treatment, but are so closely allied that it is desirable that courses should be provided in the same school or faculty. Such a faculty of mineral engineering, therefore, embraces : (1) pure mining; (2) mineral dressing; (3) extractive metallurgy; (4) geology (economic) and (5) petroleum technology.

In whatever way one examines the problem, one feature emerges, namely the necessity to widen the scope of training for the extractive industries. Unfortunately, it has been received with some reluctance in the United Kingdom, although at most colleges courses in geology and metallurgy are not entirely separated from pure mining. Courses in petroleum technology are provided at a few institutions, and one degree in mineral dressing is provided, namely at the Royal School of Mines.

The goal is a comprehensive professional training coupled with experience, with corporate membership of a professional Institution. This may be attained in three ways :

(*a*) A full-time course leading to a degree or diploma ;

(*b*) A part-time course at a Technical College, or a sandwich course leading to examinations of a professional Institution, or, in rarer cases, to a diploma recognised as an exempting qualification ;

(*c*) Apprenticeship or an articled learner with part-time study leading to Institutional examinations.

The content of courses is a question which has received a great deal of attention recently, both in this country and in the United States, and considerable divergencies have been found to exist. It is usually agreed, however, that all studies should be grounded on a solid foundation of maths, physics and chemistry, and that such basic school subjects should not be repeated in a professional school.

The lack of knowledge of fundamentals is perhaps the most severe criticism from which technological education suffers. Almost every questionnaire to industry sent out recently in the States came back with the comment : "We wish our engineering employees were better grounded in fundamentals of English, mathematics, science of engineering". Either these deficiencies must be supplied before the student commences his professional studies, or time must be found in the course to provide the required standard.

The Time for Training

If we accept the need for more basic work to be included, as indeed we must, and the inclusion of more advanced study, where are we to find the time ? There are two possibilities ; either to lengthen the course for those with inadequate knowledge of fundamentals or to omit some of the technology from the course.

The discussion on "The Training of Mining Engineers" by A. W. S. Schumann last year (I.M.M., vol. 67 (1958)) clearly shows that there are few supporters for any drastic reduction in the time spent on technical subjects, and this is confirmed by a study of the A.I.M.E. Symposium on Mineral Engineering Education in February 1958. On the other hand, there is a strong body of opinion in the United States and Canada, in Europe, and to a lesser extent in this country, which considers that certain subjects—namely surveying and assaying—should receive less attention and possibly be left in the hands of a competent specialist operative.

It is agreed by many that, although fundamental general studies are essential to the man, "know-how" is essential to the engineer and indeed to the employer, so that we must find time for a fair allocation of time to both and not add too much fundamental work at the expense of producing a less competent engineer or technologist. This forces one to the conclusion that extension of courses is necessary, although any excessive trend in this direction should be avoided. At the same time, it may be possible to reduce the amount of time by the inclusion of fewer so-called trade courses.

There is one answer to the problem which we have not examined, namely to attempt some degree of specialization in the final year, or to provide certain options for the student. One can argue that the mining engineering could easily omit assaying, which would be the option for a course with a metallurgical or mineral dressing bias, and that those studying these branches could well do without surveying, or at least all but the most elementary surveying. In the same way, probably, a quarrying option would require some surveying and some mineral dressing, but not a comprehensive course, whilst assaying could well be omitted.

...logist for the Extractive and Mineral Industries

These observations on the subject of technological training are abstracted from Mr. F. B. Michell's presidential address to the Cornish Institute of Engineers on Wednesday, September 30, 1959, at the Camborne School of Mines

This is the tendency in the United States and in many parts of Europe. Strange as it may seem, in spite of a reluctance to consider such changes in this country, we have, in fact, been doing almost the same thing for years, since we have provided coal mining and metal mining courses. In the coal mining courses, for example, the stress has been on mechanical engineering subjects, less time being spent on geology and on assaying (if any), while most of the time devoted to mineral dressing covers coal preparation.

The duration of a course is difficult to assess with any degree of accuracy, since so much depends on two major factors :

(*a*) The standard of entry to the course ;

(*b*) The number of hours per week and the number of weeks per annum spent in studies.

It would appear that, provided the student has equivalent to three " A " level passes in science and mathematics, a reasonable course can be provided in three years, but if the old " inter " year is to be included, the course of study should extend over four years as a minimum.

Preliminary educational requirements vary widely in different countries. In this country the minimum University requirement is G.C.E. passes in five subjects of which two must be at " A " level, plus certain faculty requirements. In some universities, however, three " A " level passes in specific subjects are required to enter the course, where it extends over three years instead of four years for an honours degree or its equivalent.

In the United States the entrance standard to the university is lower. In fact, some professional bodies consider that the university entrant rarely has sufficient grounding to benefit fully from his course.

U. K. Professional Institutions

The position of these institutions is unique, since it is true to say that outside this country associate membership of a professional institution does not carry the guarantee of an adequate technological training combined with experience, which exemplifies the fully qualified professional man. In other words, the British professional institutions are the only ones which require a definite standard of attainment for corporate membership and function as qualifying bodies.

This, of course, makes the membership of considerable value and indeed fully acceptable as a professional qualification, at least equal to a degree in the same way as the M.R.C.S. and L.R.C.P. diploma is related to the B.S. and M.B. degrees.

Whereas full membership or fellowship of a British professional institution can be taken to be equivalent to a higher degree, or more accurately to the professional degree awarded by American universities, membership of similar institutions in other parts of the world does not carry with it such status.

It has been suggested that there is a noticeable lack of availability of a higher degree for certain technologists and it has been suggested that the new diploma in technology (Dip. Tech.) should be accepted as a first degree for proceeding to a higher one at a university. There seems to be a definite case for this, as well as for higher diplomas by recognised colleges granting associateship.

The case for the higher professional degree seems a good one, since the Ph.D. is usually awarded for research and original work. Equally important is the position of the professional man who has to apply in practice the discovery of the research workers, and to co-ordinate existing knowledge to the best economic advantage. Why should he not be able to do a post-graduate course or write an analytical dissertation to a similar end ?

There is more than one method of acquiring a professional training, but all should lead to the same goal — an engineer or technologist who has the " know-how " and the " know-why ", and it must not be overlooked that there will always be essentially at least two levels of attainment, namely the technologist with full professional status, and the technician, with a complete knowledge at the operative level.

An examination of curricula shows that here is a notable lack of consistency in colleges covering the same nominal work. This has been criticised, but is it desirable to provide absolute uniformity and complete submergency of the individuality of courses ?

The essential requirement is a sound grounding in fundamentals on which to found further acquisition of knowledge with adequate " know-how " of the particular technology.

There would appear to be every indication that the system in the United Kingdom lags behind that of the United States and of Europe in failing to widen the field of training in the mineral industries, with perhaps more emphasis on the general and insufficient facilities for the student who wishes to specialize.

On the other hand, too early specialization is probably undesirable, but with the enormous advances in technology, one is faced with the choice of adding a year or more to the training period, or providing options instead of a rigid adherence to a fixed curriculum, thus enabling some degree of specialization in the final year.

In view of the importance of " know-why ", there is a tendency to reduce the content of " trade courses " in the curriculum, and there is no doubt that no such purely practical work should be included, unless it is designed to illustrate basic principles rather than simply demonstrations of operations.

The most difficult problem of the educator is to keep the balance between " know-how " and " know-why ". " Know-how " alone tends to produce inflexibility of mind and an inadequacy of outlook for the professional man, whilst " know-why " without the " know-how " is equally useless to industry. As far as advanced or post-graduate training is concerned, considerably more facilities should be provided, particularly in connection with the extractive industry, and there is very great scope for a college with vision along these lines. In recent years such facilities have been started at University schools in this country, notably the Imperial College, but in general the situation is considerably behind other countries in this respect.

In the same way, there is a deplorable lack of research facilities.

THE CHROME INDUSTRY IN SOUTHERN RHODESIA

THE discovery of chrome in Southern Rhodesia dates back to soon after the occupation of the country in 1890. Production was first recorded in 1907 and, thereafter, apart from restricted production during the depression years, has increased steadily with only mild fluctuations due to market conditions. Similar to other major chrome-producing countries, Southern Rhodesia is not a consumer of chrome ore and has had to rely entirely on exports to overseas countries in quantities mainly dependent on market demand. A local ferro-chrome industry commenced operations in 1954 but can only consume a very small fraction of production and is regarded as a pilot plant for a future major industry.

In Southern Rhodesia deposits of chrome are extensive, of ample ore reserve, and offer no major mining or labour problems. The industry is very efficiently organized and can produce all grades of ore as used in the world today, namely, hard lumpy and friable metallurgical ore, metallurgical concentrates, chemical ore, concentrates, and refractory ores. However, the mines suffer a geographic hardship in that they are far inland, being some 500 miles from the port and in the years past, growing production geared to market demand was severely handicapped by railway transport problems. Chrome had to compete for railway transport with higher rated traffics such as copper, asbestos and seasonal traffics such as maize and tobacco. In spite of these difficulties which have restricted maximum production for market requirements in the past, the industry has been able to maintain its position as the leading producer in the record of world production for the period 1927-1956 at an average estimated grade of 48 per cent chrome oxide content. The chrome oxide content, which after all is the vital ingredient in the material exported, is only exceeded by the ore from New Caledonia which in turn has produced less than 50 per cent of the total ore production of Southern Rhodesia during the above-mentioned period.

An outstanding feature of the industry is that despite the foremost production of 8.6 million tons averaging 48 per cent chrome oxide content, it can be stated with confidence that the ore reserves have not been materially affected and are still described as immense, unsurpassed and, to a certain extent, unlimited. In actual fact, the necessity of an ore reserve calculation has never arisen. It has recently been estimated by the Geological Survey, Southern Rhodesia Government, that a reserve tonnage of some hundreds of millions of tons exist to a depth of 500 feet below surface measured along the inclination of the seams of the Great Dyke. The average depth of workings to date on the Great Dyke deposits ranges from surface to 3,800 ft. on incline. Since 1953, the railway haulage capacity in the country has gradually improved. Previously, all exports had to be handled by the port of Beira in Portuguese East Africa. A new railway from Lourenco Marques port to Bannockburn, near Shabani, in Southern Rhodesia came into operation in 1956. These developments and expansion in the rolling stock of the railways have completely eliminated the railway transport problem for chrome ore to the extent of allowing for the export of up to one million tons per annum today which represents an approximate 40 per cent increase on the record export of over 700,000 tons in 1957. In other words, by comparison with rising market demand as expected in the future years, the railway transport problem no longer exists in Southern Rhodesia.

The following article by R. Stanley, chief technical officer, Southern Rhodesian Department of Mines, is reproduced from *The Chamber of Mines Journal*, Vol. 1, No. 3

Chrome Mineral Occurrences in Southern Rhodesia

These occurrences are classified into three separate and distinct groups, namely :—

(1) Large lenticular bodies (Selukwe, Belingwe, Mashaba and Gwanda).
(2) Parallel Seams (Great Dyke).
(3) Eluvial deposits (certain portions of the Great Dyke).

Large Lenticular Bodies

The large highly irregular shaped deposits at Seluke, Belingwe, Mashaba and Gwanda occurring in serpentine and not confined to definite horizons are older than the Great Dyke. The mineral occurrence at Selukwe was the first discovery in Southern Rhodesia and has accounted for the major production since 1907. Even today, the mines at Selukwe account for nearly 40 per cent of the total production. The Mashaba and Gwanda occurrences are rather isolated and of minor importance compared with Selukwe.

Analysis and description of various Chrome Ores in Southern Rhodesia

LOCALITY	Per cent Cr_2O_3	per cent Fe	per cent FeO	per cent SiO_2	per cent MgO	per cent Al_2O_3	Cr/Fe Ratio
GREAT DYKE :							
Friable Metallurgical Grade	48-50	11	14	5	17	10	3·0 to 3·1/1
Low Grade Dump Ore	42-46	14	18	6	14	12	2·0 to 2·2/1
Low Grade Friable Ore	44-47	14	18	6	14	12	2·0 to 2·2/1
Alluvial	53-55	15	19	2	8	13	2·3 to 2·5/1
SELUKWE :							
High Grade Hard Lump Metallurgical	47-48	9·5	12·5	5	17	13	3·0 to 3·3/1
Hard Lump Metallurgical	45-46	10	13	7	17	13	3·0 to 3·2/1
Refractory Hard Lump	38-40	11	15	9	16	14	2·1 to 2·4/1
BELINGWE :							
High Grade Hard Lump Metallurgical	47-50	11·5	14·71	5·5	13·68	13·47	2·7 to 3·0/1
Chemical Grade	45-50	15·6	20	2	11·81	15·23	2·0 to 2·3/1

The Belingwe Reserve deposits were only recently discovered and came into production in 1957. These deposits occur in isolated inclusions of ultramafic rocks in granite country. The chrome bodies occur in the steeply dipping inclusions and are isolated from one another, irregular and analagous to the location of plums in a plum pudding. The world market recession which unfortunately followed the discovery of these new deposits hampered exploration at depth. Consequently, the extent of the ore reserves has not been proved, but, from a geological point of view they are considered to be vast.

The Parallel Seams

These orebodies occur in the Great Dyke. The total area of the Great Dyke is 1,200 square miles. These deposits are confined to narrow seams varying from 2 ins. to 18 ins. in thickness and occur in the successions of the four complexes of the Dyke. The seams are spaced at regular intervals numbering up to ten and each being fairly consistent in chemical composition throughout its occurrence in the succession in each complex. Invariably, the seams below No. 3 seam termed the lower seams, are of metallurgical grade analysing an average of +48% Cr_2O_3 (chromic oxide) and a chromium to iron ratio of + 2.8 : 1. However, concentrates from these seams average 52% Cr_2O_3 with a corresponding increase in chromium to iron ratio. These lower seams are usually narrow in width compared with the upper seams and average between 2 and 6 ins. The upper seams vary from 8 to 18 ins. in thickness and are usually of chemical grade having a lower Cr_2O_3 content. Concentrates produced from these seams have a chrome to iron ratio of 2.3 : 1 and a chrome oxide content of 49 per cent. As stated previously the ore reserves of the Great Dyke have been conservatively estimated at some hundreds of millions of tons to a depth of 500 ft. measured on the dip of the seams.

Eluvial deposits

Recent investigations of the soils of the Great Dyke in the northern portion have proved a further source of supply of high-grade chromite. These deposits occur in the flat and poorly drained areas within the Dyke margins where the weathering of the serpentine has resulted in a natural concentration of chromite in the soil to an average depth of approximately 15 ins. Several eluvial deposits are being successfully worked at present and the chromite is recovered by modern flotation methods.

General

The extent of the chrome bearing areas in Southern Rhodesia may be gauged by the latest record of claim areas pegged, which now stands at 5,234 blocks of claims or approximately 500 square miles.

The tabulation below shows the approximate range of analyses of ores from various deposits and proves that chrome ore of all grades, as required by the industry in the world today, is available in large quantities from Southern Rhodesia.

Chile's New Iron Ore Industry

IRON is becoming one of Chile's most important mineral exports. Up to 1955, Bethlehem Steel was practically the only company exploiting Chile's iron ore reserves. Bethlehem's exports have declined, as more and more of its production was taken by Chile's steel mill at Huachipato (Compania de Acero del Pacifico). The exports of new mining companies, such as Santa Fe, Santa Barbara and Cerro Iman, now exceed those of Bethlehem, and these newcomers are expected to step up their operations sharply in the next few years.

Prospects for the new iron ore industry are discussed in a study of the Outlook for Chile's Foreign Trade and Economy, made at the University of Chile in Santiago. under the direction of Dr. Joseph Grunwald. There is considered to be little doubt that iron ore will constitute one of Chile's major export earners. It will replace nitrates in relative importance after 1960, and by 1965 iron ore exports are expected to bring in about twice as much foreign exchange as nitrate exports.

Production Programmes

The production programmes given by the companies were examined and found quite realistic and even conservative. They were therefore taken as the basis for the "high" and "low" projections given herewith. The only difference between these two sets of projections for export volume is that, for the "high" projection, it is assumed that the new El Laco mine will begin operation after 1963, so as to increase total exports by 4,000,000 tonnes in 1965. Under the "low" projection, El Laco is not scheduled to commence production until after 1965.

	Export Volume (000 tonnes)		*Average Price ($ per ton)*		*Export Value ($000)*	
	Low	*High*	*Low*	*High*	*Low*	*High*
1959	4,880	4,880	7.7	7.9	37,576	38,552
1960	5,608	5,608	7.9	8.4	44,303	47,107
1963	8,270	8,270	8.5	10.0	70,295	82,700
1965	10,829	12,270	9.1	11.2	98,544	137,424
Average annual rate of increase 1959-65	14.1%	14.7%	2.2%	6.0%	17.4%	23.6%

The prices received for Chilean iron ore have been consistently a fraction of world prices. The causes of the difference are a lower quality product (the ore containing more impurities such as phosphorus) and higher freight costs from Chilean ports. These factors, however, will become less important in the future, since the quality of Chilean iron ore is improving with new production methods and with the opening of new fields. Likewise, freight costs are being greatly reduced by the introduction of bulk carriers, which more Chilean ports are now able to handle. For these reasons, Chilean prices are expected to rise significantly during the next few years. However, it is anticipated that Chile's favourable geographical position, the deficiency of its maritime transport, and the rather inferior quality product will make the Chilean price, f.o.b., remain below that of other countries in order to enable Chile to compete in world markets c.i.f.

In the "high" projection, it is assumed that bulk carriers will come into much greater use and that therefore the shipping charges will be reduced, so that under given c.i.f. prices Chile's f.o.b. price can rise substantially.

MINING MISCELLANY

It has been announced from Paris by Mines de Fer de Mauritanie (Miferma) that negotiations to transport iron ore deposits from Fort Gouraud, French Mauritania, across the Spanish territory of Rio de Oro had broken down. It will now be necessary to build a line wholly on Mauritanian territory, which means an increase in length and cost, and a loan is being sought from the World Bank for $60,000,000. Miferma, which includes French, Italian, British and German interests, plans to produce high content iron ores. The company's ore reserves are reported to amount to 100,000,000 tons.

★

The first shipment of iron ore from the Peruvian Acari mines was made from the port of San Juan on August 28. It was hoped to produce 1,000,000 tons of ore in the first year of operation, with a 65 per cent mineral content, and 2,000,000 tons annually thereafter.

★

It is reported from the Ukraine, that 103 collieries in the Stalino economic area (Donbas) are to be completely mechanized in the next two or three years. The mechanization plan is expected to release 30,000 miners from manual labour, but these will all find employment, however, because thirty new collieries are projected for the area in the next seven years.

★

The Nippon Mining Co., of Japan, is reported to be interested in the Portezuelo copper mine which is located in the northern part of Antofagasta Province, Chile.

★

Compania de Aceros del Pacifico, owner of the El Algarrobo mine in Chile, is planning a programme for the exploitation of its high-grade iron resources, starting in January 1960. Consignments will be shipped through the mechanized port of Las Lozas near Caldera, in Atacama province. Compania Minera Santa Fé and its partner, the Canadian Ore Development Co., owners of the El Dorado, El Pleito and El Carmen mines, all of which are high high-grade ore producers, expect that this year's aggregate output will exceed 2,000,000 tonnes. Modern equipment for the expansion of production was recently received from England.

★

John Thom, Ltd. — a member of the Cementation Group — working on a £70,000 contract for Steel Bros. & Co., at Ramsbottom, Lancs., claim to have set up a new record for depth drilling in the U.K., when a nine-man crew comprising one supervisor, two drillers and six labourers, working in shifts round the clock for six days a week, reached a total depth of 5,515 ft.

★

Eire's first exports of copper ore and concentrates from the St. Patrick Mines in Avoca amounted to 13,928 l, tons, valued at £400,659 for the first half-year. West Germany was the largest importer, taking 60,100 l. tons, with Sweden second with 3,510 l. tons and Spain third with 2,773 l. tons.

★

Electrokemisk A/S, of Norway has joined Koppers Co. Inc. of Pittsburgh, U.S. and Strategic Materials Corporation of New York in the commercialization of Strategic-Udy processes to smelt and refine iron ore and other minerals. Electrokemisk is to design and supply electric furnaces for plants using Strategic-Udy processes, while Koppers has exclusive world rights to design and build integrated Strategic-Udy plants.

★

The Research Council of Alberta reports that the iron deposits in the Clear Hills area in north-western Alberta are estimated at more than 1,500,000,000 tons. Clear Hills are 50 miles northwest of the town of Peace River and 25 miles north of Hines Creek, a terminus of Northern Alberta Railways.

★

An Investment Bill which may attract foreign capital to Burma, has been passed by the Chamber of Deputies and is now before the Burmese Parliament. An important clause of the Bill guarantees that no investment will be nationalized within 10 years of its inception, and allows the President of the Union to extend the period of immunity a further 10 years. Although the Bill is not clearly phrased, senior Government officials have stated that immunity might be granted for 20 years at the outset.

★

The American Zinc Lead and Smelting Co. will re-open mining and milling facilities in New Diggins, Wisconsin, which were closed in 1957 because of the low price for slab zinc. The mines should be in full operation in four to six weeks, and annual production of zinc and lead concentrates from the beginning of 1960 is expected to be 12,000 to 15,000 tons.

★

Two executives of the Japan chemical enterprise of Toyo Soda Manufacturing Co. have arrived in Israel to study various chemical processes developed by Israel Mining Industries Ltd.

★

Ugine has received an exploration permit for nickel and a permit for chrome in Madagascar. The company has already taken an active part in the exploration of mining resources in Madagascar and valuable information has been obtained. However, industrial production of the two metals will depend on the market outlook. Hitherto the company has not planned to mine nickel in Madagascar, although it has found a special process to treat low-grade ores under commercially interesting conditions. Although the chrome reserves are believed to be relatively small, the company has decided to exploit the deposit.

★

In addition to the Andacollo Mine in the Putaende Region of Chile, which they recently brought into production, the Andacollo Mining Co. Ltd. have acquired the San Juan mine and started shipments to the Llayllay mill in September. The final product from both mines is a 35-50 per cent copper concentrate. Mr. Howard Stevel Strough, president of Andacollo, reports that his group is now finalizing arrangements to set up a 200 to 250 ton mill on the Cerro Landa copper property in Peru. It is further stated that preliminary work over the last few years, at a cost of $150,000, has proved several hundred thousand tons of 6 per cent and better Cu in an enriched zone and a possible orebody of many millions of tons averaging better than 3 per cent. Cerro Landa has a surface extension of some 12 square miles and an additional 18 square miles have been staked.

The Russian authorities are reported to be building up what is claimed to be the only amber mine in the world — that at Palmnicken in the part of Germany now under Russian administration (not the East German Republic). The mine is now to be known as the Jantarni Combine. It is expected that within seven years the mine will be fully mechanized. At present the mining area is not more than one km. in length. Current production is estimated to be at the rate of 25 to 30 tonnes annually, which compares with an output of 380 tonnes in 1927. This has had its effect on the market price of amber. In 1930 one tonne of amber cost, according to quality, between 2,500 and 300,000 German marks. Today the price per tonne may be anything up to 800,000 marks. There are over 100 qualities of amber.

★

It is reported from Western Germany that an amalgamation between the oil, chemical and coal mining firm of Deutsche Erdoel A.G. (DEA), and Rheinpreussen A.G., the big coal mining and chemical products company, is under consideration. About three-quarters of the shares in Rheinpreussen are held by the Haniel family, and it is proposed to exchange five of these shares for four in DEA.

★

The first overseas opal-mining safari is shortly being undertaken by twenty-two gem and mineral collectors flying from Canada to Australia. They will spend four days at Andamooka field, South Australia, and afterwards visit White Cliffs field, near Broken Hill.

★

Inland Steel Co. has joined Youngstown Sheet and Tube Co., Steel Company of Canada, Ltd., Interlake Iron Corporation and Pickands Mather and Co., to investigate the development of a large body of iron ore in the Wabush Lake area of Labrador. Inland Steel will become 10 per cent owner of Wabush Iron Co., which is managed by Pickands Mather and Co., who have been exploring the area since 1952. Wabush Iron Co. have a long-term lease on a five-square mile tract near the west border of Labrador, 200 miles north of Seven Islands, the St. Lawrence River loading port. A pilot plant currently under construction will begin shipments in 1960 in sufficient quantities for large-scale steel plant tests of ore concentrates from the region. Construction of permanent facilities is expected to begin in 1961 with shipments to start by 1965 at an initial production level of 4,000,000 to 5,000,000 tons.

★

It is reported from Israel that a second phosphate plant will shortly start operations near Ein-Yahav, on the new Sodom-Eilat highway.

★

Some members of the geological expedition organized by the Geological Department of the Hebrew University in co-operation with the Israel Geological Survey have returned from an expedition to East Africa, which was made to compare the geological formations and volcanic rocks of the East African Rift Valley with those of the Jordan and Arava areas.

★

Four helicopters from the fleet of Fison-Airwork of Bourn have been chartered by the French Compagnie

Reynolds de Geophysique to help complete a geophysical survey in the French Sahara. These four Hillers, were flown out to El Golea, Algeria, in Dakmasters belonging to Transair, another Airwork Group company. They will work in pairs over an area about 200 by 40 km. from a base near Setar. The work, which should be completed this year, is preliminary to oil exploration in the area.

★

A giant earth-digging machine, for opencast mining, now being built at the Novo-Kramatorsk Engineering Works in the Ukraine, is expected to remove over 3,900 cu. yds. of earth every hour, and shift it a considerable distance. A rotor excavator about 140 ft. high will clear a layer 130 ft. thick by means of a multi-bucket mechanism. Earth will be continually removed by a trunk belt conveyors to a total distance of over 2¼ miles. Incorporating many automatic devices and industrial television equipment, the machine, which will be completed next year, is expected to effect considerable saving on conventional single-bucket excavators, and trucks on rails.

★

It has been announced from Nyasaland that a drilling programme has been planned in the Ncheu District, where it is hoped to find substantial deposits of kyanite.

★

Fifteen geologists and mining engineers from Asia and the Far East arrived in Vancouver on September 19 to begin a two-week tour of Canadian mines and plants. The Study Tour, sponsored jointly by the U.N. Bureau of Technical Assistance Operations and ECAFE, has been arranged to help advance the knowledge of modern geological and mining techniques.

★

A new gold find with copper implications is reported on ground owned jointly by Campbell Chibougamau Mines and Chibougamau Mining and Smelting Co., in northwestern Quebec. The discovery was made in surface prospecting, and a thorough investigation programme has been ordered.

★

A 15-year agreement for technological assistance has been signed between the Kobe Steel Works, of Japan, and Aluminium Laboratories and the International Aluminium Co. Both of these are subsidiaries of Aluminium Ltd., the latter being the company's sales unit in the Far East. Under the agreement Aluminium Ltd. offers the Kobe Steel Works "a comprehensive technical assistance programme for the fabrication of aluminium products". Kobe will purchase aluminium from the Canadian company. The contract is subject to ratification by the Japanese Government. It was also announced that on October 1 International Aluminium was to change its name to Alcan Asia Ltd.

★

Ferrum Exploration and Development Co. in the Philippines has spent P.300,000 to date in extensive exploration and development work on its ferrum-nickel properties in Homonhon Island, Samar. Last month the company shipped 500 tons of sample laterite nickel-ferrous ores, and is stockpiling an average of 15,000 tons of ores, in the expectation of an early conclusion of sales agreements with foreign buyers. The positive block ore reserves within Group I area of the Homonhon mines are estimated at 3,000,000 tonnes, worth about P.60,000,000 and good for at least 20 years of continuous mining operations. Homonhon latherite can be surface mined with machinery and equipment bought locally at moderate cost.

★

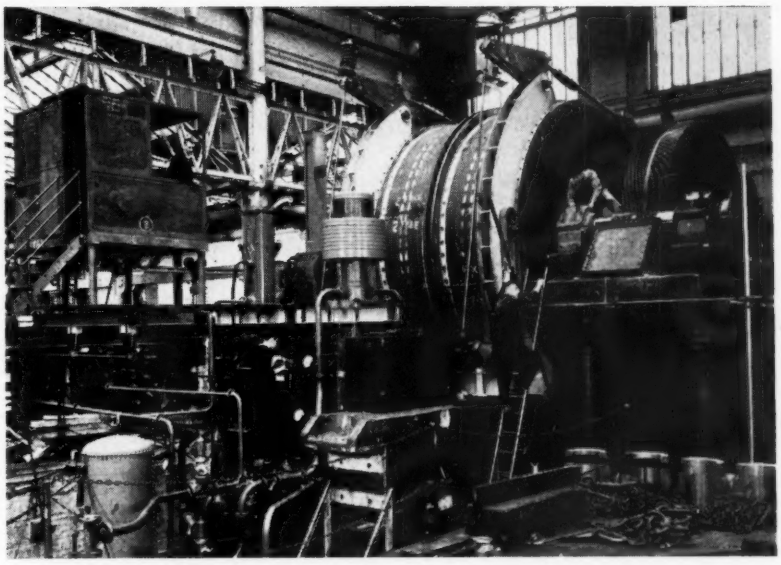
Czech imports of iron ore are to increase steadily, it is stated in a Czech Government report. Imports from Sweden are planned to be increased by 50 per cent on last year's total, and trial purchases have been made from Morocco, Angola and Tunisia. The processing of sample consignments from Tunisia leads the country's authorities to believe that imports from Africa will increase considerably in the future. Czechoslovakia imported a total of 3,287,000 tonnes of iron ore in the first half of this year, as compared with imports of 2,621,000 tonnes in the same period of 1958. Pyrites imports rose from 18,000 tonnes in the first six months of last year to 20,000 tonnes in the first half of 1959.

★

A large ore handling plant has been commissioned in the Rotterdam Waal Port (at the estuary of the Rhine) for the NV Stuwadoors Maatschappij Kruwal to serve the steel works on the Lower Rhine whose ore requirements have increased considerably over the last few years. The plant comprises two travelling unloaders of 70 m. span with a 45 m. long hinged apron on the waterside and 16-ton capacity mantrolleys which unload the ore arriving in seagoing ships into river barges. This new plant handles 5,000,000 tons of ore per year for delivery to the steel mills on the Lower Rhine. Two of the four unloaders have been supplied by M.A.N. (Maschinenfabrik Augsburg - Nürnberg AG).

★

A new electric winder has been manufactured and installed by the General Electric Co. at No. 3 Shaft of Littleton Colliery in the West Midlands Division of the National Coal Board. The winder is a double-drum single-clutch machine, each drum being 16 ft. dia. and 3 ft. 8 in. wide. It is driven by a 6.6 kV. 2,000 h.p. G.E.C. induction motor and is equipped with the Company's patented system of dynamic braking with speed control. Its hoisting capacity is 220 tons of coal per hour from a depth of 1,634 ft. The brake gear is one of the suspended parallel-motion type, operated by a Fraser and Chalmers standard air/oil pressure-type brake engine with a weight engine for holding the loose drum when de-clutched.



The mechanical part of the General Electric Co.'s new electric winder of No. 3 Shaft of Littleton Colliery in the West Midlands Division of the N.C.B. awaiting installation

PERSONAL

Mr. Robert Fraser has resigned from the London Committee of Dominion Reefs (Klerksdorp) Ltd.

★

Sir Ewen M. F. Fergusson has been appointed a director of Gopeng Consolidated, Ltd., and of Kinta Tin Mines Ltd.

★

Mr. Harold C. Drayton and Mr. J. D. McCall have been appointed directors of the Consolidated Gold Fields of South Africa and of New Consolidated Gold Fields.

★

Mr. Walter Meier, for many years manager of A. Strauss and Co., Ltd., has been appointed a director.

★

Mr. W. S. Findlay has been appointed a director of De Beers Industrial Corporation, with Mr. W. H. Ferrar as his alternate.

★

The new President of the Purchasing Officers Association is Mr . A. H. Thomas, of British Belting and Asbestos Ltd.

★

Mr. G. T. Coughtrie has been appointed managing director of Belmos Co. Mr. Thomas Coughtrie has relinquished the position of managing director, but will continue as chairman of the company.

★

Mr. Arnold L. G. Lindley has been appointed a director of North British Locomotive Co. Mr. J. T. Fleming has resigned.

Machinery and Equipment

The Coal Miner's "Hidden Eye"

For the first time in the history of British coal mining, radioactive isotopes are to be used to aid underground coal production. The Midget Miner, the first machine to incorporate an experimental nucleonic device, is to be installed at New Lount Colliery, Newbold. This machine has been devised by scientists of the National Coal Board's Mining Research Estabishment, at Isleworth, which has been working in collaboration with personnel of the East Midlands Division.

With some of the machines in use today, it is very difficult for the operator not to cut into an uneven floor, particularly when the coal face is in a confined space. The Midget Miner has been designed with a "hidden eye" steering device, so that power loading machines avoid cutting into the rock floor of the seam as they proceed on the coal face.

Low energy gamma-rays are emitted by the radioisotope mounted on the base of the machine near the floor. A meter, fixed in view of the operator, measures the intensity of reflection of these rays, and indicates variations in the thickness of a "skin" of coal left by the machine. The operator will be able to assess the distance between the floor and the lower coal cutters, and even where the seam undulates slightly, can avoid cutting into the rock floor.

Further possible uses of the device are being examined for this and other machines, and it is planned to obtain completely automatic and accurate steering control by linking the information from the nucleonic probe to electro-hydraulic valves operating the machine's steering system.

Great care has been taken to render this nucleonic probe absolutely safe for operators and others using this device which can be made harmless for dismantling and replacement. In the first instance a small solid radioactive source with a short active life is to be used, but other sources are being investigated with a view to their eventual use.

Some interesting data have been given concerning the Midget Miner, which is a fairly new machine designed particularly for use in thin-seam mining. At New Lount colliery it has raised output per manshift to 5.6 tons, compared with 3.5 to 4 tons obtained by more conventional mining machines. These figures have been obtained when used in a seam only 2 ft. 5 in. thick, with a face 122 yds. long where more than 170 tons of coal per shift were mined.

ESTABLISHING AUTOMATIC CONTOURS

The automatic drawing of contour lines showing ground elevations has been realized by Stereomat, an instrument developed by Hunting Associates Ltd.

The device replaces the human operator in the delicate and fatiguing task of establishing contours on photogrammetric maps made from aerial photography. It promises benefits to mining, heavy construction and other industries requiring fast and accurate mapping service and also has tremendous potential in resources explorations and in civilian and military mapmaking.

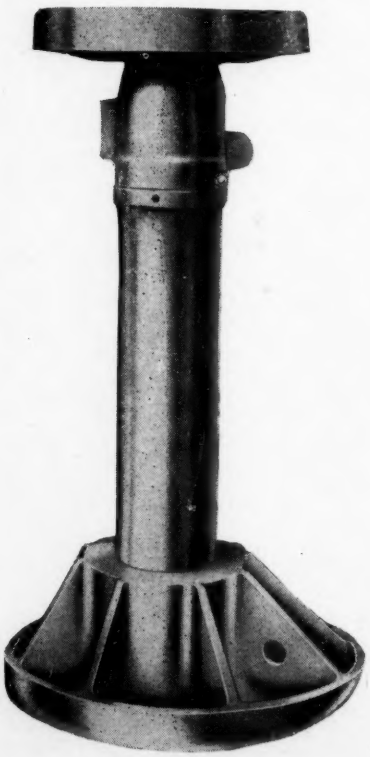
It employs a complex array of electronic, optical and mechanical gadgets to trace correct contour lines in conjunction with a stereoplotter — another machine which allows nearly-identical aerial photographs to be viewed in precise relationship for three-dimensional effect.

NEW HYDRAULIC ROOF SUPPORTS

Since the innovation of the hydraulic pit prop in 1946, Dowty Mining Equipment have delivered to the industry 1,500,000 props. Experience and associated research have lead to the development and introduction underground of two new products, the 20-ton Duke prop and the 50-ton chock. Dowty equipment was displayed at the Mining Machinery Exhibition at Olympia in July, and was noted in our exhibition supplement published at that time.

Seam heights between 2½ ft. and 7 ft. are covered by this new range of props from these manufacturers. The range consists of six basic sizes, each having a series of six detachable extensions, making a total of 36 props. The shortest prop has an extended length of 28 in. and a hydraulic travel of 7½ in., while the longest has an extended length of 85 in. and a travel of 28 in.

The Dowty 50-ton hydraulic chock



The operation of the Duke prop is more readily understood if separate consideration be given to the four principal assemblies. An initial description was published in our issue of September 26, 1958; more complete details have recently been released by the company.

The top detachable extension of the Duke is cast from B.S.C.10 Grade III Blackheart malleable cast iron having a minimum U.T.S. of 22 tons p.s.i.—in six engths which will increase the overall length of the prop from zero to 9 in.

The body of the prop is basically three concentric tubes of cold drawn steel whose minimum U.T.S. is 28 tons p.s.i. The inner tube, which is the sliding member, houses the pump, yield valve, release mechanism and the breather. This tube has a bore of 3.591 in. and a wall thickness of 0.142 in., and serves as the reservoir for the hydraulic fluid.

The cylinder is the pressure vessel, having a bore of 4.0 in. and a wall thickness of $\frac{3}{16}$ in. The guard tube completes the trio with a bore of 5.0 in. and wall thickness again of $\frac{3}{16}$ in., giving protection over a distance a little greater than that travelled by the gland assembly in the cylinder. Relative movement between the sliding members is effected through two bearing assemblies, one on the lower end of the inner tube which includes the gland, and the other housed in the swaged bell mouth of the cylinder together with the wiper ring.

A reciprocating piston pump is housed in the inner tube and operated through a crank by means of a detachable pump handle. Normal pumping action causes oil to be drawn from the reservoir on the upstroke into the pump cylinder. The downstroke causes the annular inlet seal to deflect downwards, sealing the pump inlet and forcing the ball-valve off its seat against return spring pressure and pressure in the cylinder expelling oil into the cylinder.

The Duke is released from any load up to its yield load by a single manual operation resulting in two consecutive reactions in the prop. Release is afforded through pilot and main valves which operate with a one second time-lag between them. The pilot valve consists of a small diameter spindle operating on a small ball-valve releasing high pressure, the full travel of the spindle causes a shoulder at its top end to depress the large diameter valve against the lowered pressure permitting the quick freeing of the prop. Breathing is provided by a new gravity-type aspirator situated at the top of the inner tube which also serves to seal the prop against oil leakage should it be inclined to any angle greater than 40 deg. to the vertical.

Normal pumping will extend the prop at the rate of .19 in. per stroke. This is the minimum speed of extension with normal pumping. The increased robustness of the prop has made it possible to impose, with safety, yield loads offset to 2¼ in.

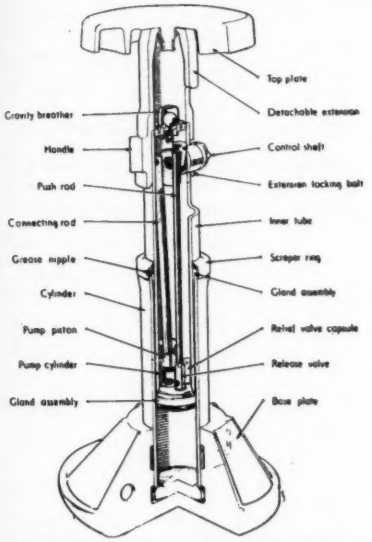
The yield valve operates at 20 tons to 22 tons and reseats when the load drops by a maximum of ¾ ton, during which time the prop will have closed a distance of .005 in. to .015 in. depending on the convergence rate.

Dowty engineers were quick to realize that the same hydraulic and mechanical principle so successfully applied to the Duke Prop would be eminently suitable to the special needs of waste-edge support. The resulting equipment is the 50-ton hydraulic chock.

The range is composed of three basic sizes, to which may be added any one of five cast extensions, providing a total of 15 chocks. The smallest of these has an extended length of 35.5 in., with an 8-in. travel, and the longest 66.5 in. with a 16-in. travel.

The details of the chock may be more easily understood if they are examined under four main assemblies.

The material used in manufacture of the top plate is a proprietary cast iron, having a minimum U.T.S. of 33 tons



Diagrammatic view of the Dowty 50-ton hydraulic chock

p.s.i. The plate is of 15.25 in. dia. with radiused corners, giving an effective surface area of 154 sq. in. for a weight of 65 lb. It is spigotted into a pocket in the top extension which allows it to tilt to a maximum angle of 25 deg. where it locks. The circular design with its generous ribbing and deep section eliminates the possibility of the plate deforming, a defect to which similar tops are often most prone.

The top mechanical extension is located on the top of the inner tube by a machined shoulder. The length of the extension above this shoulder is varied to give four increases in the overall chock length from zero to 11 in. The skirt of the extension below the shoulder ends beyond the pumping spindle, beneath which a bolt passes locking the cast extension to the inner tube. Blackheart malleable cast iron is the material specified for the extension, giving a minimum U.T.S. of 22 tons p.s.i. for a 4 in. bore and 0.56 in. wall thickness. Cast into the extension is a handle placed diametrically opposite to the pumping spindle. This offers considerable aid to the operator when pumping and setting.

Essentially the body of the chock is composed of two concentric tubes, the smaller called the inner tube, sliding axially in the greater, which is called the cylinder. The purpose of the inner tube, which has a bore of 4 in. and a wall thickness of $\frac{1}{4}$ in. is to house the pumping and release mechanisms, the breather and yield valve capsule. It is also the reservoir for the hydraulic fluid. Movement relative to the cylinder is made via the two bearing assemblies, one housed at the lower end of the inner tube and the second in the bell-mouth of the cylinder, which is the pressure vessel, and like the inner tube is cold drawn from steel of 28 tons p.s.i. U.T.S. The bore of the cylinder is 4.875 in. and its wall thickness $\frac{1}{4}$ in.

The 153 lb. baseplate is cast from the same material as the top plate and has an effective area in contact with the floor of 255 sq. in. The casting is designed to sledge easily over the uneven floors whilst providing the maximum stability to the chock, the longest of which remains stable fully extended up to an angle of 19 deg. There is a hole in the front web for attaching a sylvester or pushing jack.

The actions of pumping, setting and releasing are identical to those of the Duke. In addition to these, there are various methods of manoeuvring the chock which are dependent on the degree of mechanization of the face.

When the chock has to be advanced, two methods may be used. They are either to couple the base plate to the conveyor panside through a double acting jack or, more simply, to attach a rope and pull it forward.

The chock may be extended at the rate of $\frac{1}{4}$ in. per stroke under the weight of the top extension and plate. A few strokes on the pump after contact with the roof has been reached will accurately induce a setting load of 5 tons. The pumping mechanism has been so designed that the lightest of setting action will achieve the 5 ton load.

Releasing the chock may be accomplished normally with an upward movement of the pump handle or, should conditions demand, by a direct pull of 110 lb. on the pump spindle shackle from a safe distance. The automatic relief valve is pre-set to yield at a load of 50 tons, and reseat when the load has decreased by a maximum of 1.5 tons, during which time the chock will have closed 0.022 in.

A NEW TILTING FURNACE

A new tilting furnace especially designed for rapid bulk melting, both for the die casting and the general non-ferrous industries, is the BT Mark 2 unit manufactured by The Morgan Crucible Co. Ltd. This oil-fired basin tilting furnace provides rapid melting of aluminium and copper alloys.

The metal is melted in the crucible and is therefore protected from contamination and local overheating. Tests show that metal loss when melting aluminium is under 1 per cent. A low platform, coupled with the wide, open-top basin crucible, simplifies charging. A further factor is that automatic tilting with finger tip operation ensures efficient control. Indeed, the basin is claimed to be the most economic type of crucible for a given load capacity because its shape holds the maximum amount of metal for a given crucible weight. Statistics show that the A287 basin takes 380 lb. of aluminium, while the A387 takes 500 lb.

It is not necessary to scrap the frame of a Symons Cone Crusher when the top is worn out. At The General Electric Co.'s Erith works the worn top can be cut off and a new top welded on. The machine illustrated is a 2 ft. Symons Standard Cone Crusher which was built in the Fraser and Chalmers Engineering Works of The General Electric Co. Ltd., to the order of Nordberg Manufacturing Co. and installed in the Manuel Works of John G. Stein and Co. Ltd., at Linlithgow. It was employed for crushing chrome ore required in the manufacture of refractory bricks, and was recently sent back to the manufacturers for reconditioning. Similar repairs have been carried out on the larger sizes of crushers

The furnace requires a 3 h.p. fan, delivering 250 cu. ft. of air per min. at 25 in. water gauge pressure. The maximum oil fuel consumption is 10 gal. per hr. The complete furnace weighs 37 cwt., the body alone 25 cwt.

NEW SHOT BLAST HELMET

A wider angle of vision and greater comfort are among the outstanding features of the new Black Knight shot blast helmet introduced by the R.F.D. Co. The helmet is claimed as unique in that it can be kept in permanent commission. All parts are replaceable and spares can be kept in hand so that it need never be returned to the manufacturers for maintenance or servicing. Since all parts are washable, a high standard of hygiene can be maintained. The specially reinforced shell is moulded in glass fibre and covered with a tight fitting Latex envelope made in two window sizes. The air inlet connection for $\frac{1}{4}$ in. bore supply hose is at the back of the helmet and air is channelled downwards over the window to prevent misting.

SORTING AT RHODESIA BROKEN HILL

A heavy media plant at Rhodesia Broken Hill is now being used to separate the mineralized rock from dolomitic waste and thus reduce the acid consumption in the subsequent acid leaching plant. Formerly hand sorting was employed and the new plant is designed to handle 75.G tons per hr., using a Wemco drum separator and ferrosilicon medium.

Metals and Minerals

Is Wolfram Settling Down?

Wolfram ore shipment prices in London are today indicated at 132s. 6d.-137s. 6d. per l.ton unit, c.i.f. Europe, which compares with 140s.-145s. as quoted in our previous issue. After several days of virtual inactivity, it is understood that deals have recently been put through at 135s. and 132s. 6d.

Current prices are now 30s. below the highest levels reached in the recent sharp rise, and it appears that the market is in the process of settling down, though it still remains very quiet. Though reports from some quarters suggest that at the prevailing lower levels there is rather more enquiry about, the general feeling among dealers is that the price structure looks none too assured and a further easing in values would occasion little surprise. This has an all too familiar ring!

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The development of a new, simple method for producing commercial-grade tungsten and molybdenum powders suitable for use in steel and other alloys has been announced by the Interior Department of the U.S. Government. The method, known as fused-salt-bath electrolysis, was tested successfully on scheelite, which usually contains the undesirable molybdenum mineral, powellite, as an impurity. Metallurgists at Bureau of Mines laboratories in Reno, Nevada, are reported to have treated typical scheelites, producing molybdenum of 98 per cent purity and tungsten of better than 99 per cent purity in a single operation. To separate tungsten by the usual commercial methods is extremely involved and expensive, states the Bureau of Mines, requiring complex chemical purification and hydrogen reduction. Furthermore, no molybdenum can be recovered.

The report adds that, unlike the large and complex commercial plants normally associated with tungsten recovery, tungsten-molybdenum installations employing the new process could probably be small. Compact electrolytic plants of the type envisaged would permit economic shipment of tungsten and molybdenum to market from scheelite operations that otherwise might not be profitable.

It has been further reported that high-purity tungsten, essential to space and missile programmes, is being captured from a mixture of gases and simultaneously formed into simple shapes at Bureau of Mines laboratories in Rolla, Mo. The method is said to utilize a process known as low-temperature vapour deposition, in which pure tungsten metal is extracted from a mixture of tungsten hexafluoride and hydrogen gases by passing the mixture over a heated metal surface.

These new processes are interesting examples of the encouraging results arising from the research effort currently devoted to a metal whose interesting potentialities for widening usage are by no means confined to the high temperature field.

COBALT QUOTAS REJECTED

The Office of Civil and Defence Mobilization has turned down an industry petition seeking higher tariffs and the placing of quotas on U.S. imports of cobalt. An announcement by Mr. Leo A. Hoegh, director of OCDM, stated that an investigation had determined that cobalt imports were not threatening to impair the national security. The plea for relief against imports was requested by the Home Sound Co., of New York City, and its subsidiary, the Calera Mining Co.

In 1958 U.S. imports of cobalt metal totalled 7,250 s.tons, of which 4,500 s.tons came from the Belgian Congo, 1,000 from Belgium, and 500 from Canada.

MANGANESE BARTER DEALS

Ferro-alloy makers in Japan are reported to be greatly concerned about the outcome of the U.S. Government's recent decision to exclude raw cotton from the list of American surplus goods permitted for bartering with mineral products for its strategic stockpiling programmes. The Japanese industry late last year contracted with the Commodity Credit Corporation of the U.S. to export 13,300 tons of ferro-chrome in a barter with American surplus raw cotton. Furthermore, ferro-manganese manufacturers, who continue expanding their production facilities in view of the possible growing domestic and external demands, are seeking larger export outlets in the U.S. in exchange for raw cotton.

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Brazil and U.S. exporters have completed a barter deal under which Brazil will receive 2,200,000 bushels of U.S. hard wheat in exchange for manganese. Shipments of these commodities are scheduled to take place during October.

MICA IN 1958

The estimated world production of mica in 1958 was 320,000,000 lb., the same as the revised 1957 figure, reports the Burea of Mines, U.S. Department of the Interior. It thus remained above the 300,000,000 lb. level for the fourth consecutive year.

Domestic mica sold or used in the U.S. in 1958 increased about 1 per cent in quantity and 6 per cent in value compared with 1957. Consumption of sheet (block, film and splittings) decreased 28 per cent to 8,200,000 lb., while total imports and exports declined 14 and 11 per cent respectively compared with 1957. Imports for consumption, however, were 22 per cent higher in value, this increase being attributed to the high values reported for imports of block valued above 15 c. per lb., splittings, and film mica. General imports, according to compilations by the Tariff Commission, increased 7 per cent compared with 1957. Brazil, for the third consecutive year, was the largest supplier of good stained and better block mica. U.S. imports from India totalled 1,116,937 lb. valued at $2,873,682.

According to reports by U.S. domestic fabricators of mica 1,473,000 lb. of block and film mica was fabricated in the second half of 1958. This was 6 per cent more than in the first half of 1958, but 14 per cent less than in the last half of 1957.

Fabrication of muscovite ruby and non-ruby block and film mica totalled 1,468,000 lb., of which 98 per cent was block mica. Consumption of phlogopite block mica was 31 per cent greater than in the first half of 1958; electronic uses consumed 18 per cent of the total fabrication, as in the first half year.

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The U.S.S.R. has placed substantial orders for the supply of Indian mica, acording to Mr. S. K. Sen, chairman of the Mica Export Promotion Council of India. Mr. Sen, complained that, although India met 81 per cent of the world's needs for mica, she was unable to get a "proper" price for her exports owing to the lack of a healthy association of exporters to formulate a code of conduct and stop the practice of rate cutting.

TURKISH CHROME FOR BARTER

The Turkish Ministry of Commerce has announced that exporters may use chrome ore with a chromium content not exceeding 42 per cent for barter deals with countries which do not have a trade or payments agreement with Turkey. The Ministry said that any such barter deal must be concluded within the next six months.

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Japan has made her first purchase of Turkish chrome ore. Some 10,000 tonnes were shipped from the port of Iskenderun recently, but it is not known whether further shipments are contemplated.

RHODESIAN NICKEL PLANT

Last week we reported that the Japanese nickel refining company, Shimura Kako, had signed an agreement making it a part owner of the Trojan nickel mine at Bindura, in Southern Rhodesia. It has since been confirmed that the agreement provides for construction by the Japanese company of a nickel smelting and refining plant at Bindura. The latest announcement states that the project will involve a total investment of £2,000,000 and the plant will produce nickel matte for shipment to Japan for electrolizing. Trojan's nickel ore resources are given as about 40,000,000 tons.

LITHIUM AND BORON

The Defence Department of the U.S. Government has decided to close down a large, high-energy boron fuel plant in the Buffalo-Niagara Falls area which Olin Mathieson Chemical Corp. was to operate for the Air Force. A smaller plant will be kept open in the area to carry out research and development work. Another high-energy fuel plant that Callery Chemical Corp. operated for the Navy in Muskogee, Oklahoma, will be retained on a stand-by basis. These decisions followed recent cancellations of high-energy fuel programmes being developed for the B-70 bomber and other future weapons. Officials have indicated that the B-70 will probably use conventional jet fuels.

Mr. F. B. Shay, vice-president, production, of the Foote Mineral Co., states that the recent cancellation of work on boron aircraft fuels should have little real effect upon producers of boron compounds, since more than 700,000 tons annually are marketed in glass, ceramics, and other industries.

Lithium mining suffered a setback when the A.E.C. announced that it would not renew its various contracts for lithium chemicals. It has since been announced that large quantities of highly enriched lithium for use in atomic reactors are to be made available by the Atomic Energy Commission for civilian use at sharply reduced prices.

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In a statement issued recently by Mr. Pierre Beauchemin, president of Quebec Lithium Corporation, it was disclosed that, following the refusal of Lithium Corporation of America to accept delivery each month of 17,000 units of lithium up to March, 1962, in terms of the existing contract dated March 5, 1959, an action for contractual damages in the amount of $4,477,924 had been taken against Lithium Corporation of America.

Quebec Lithium Corporation is forging ahead with the construction of a lithium refinery at its mine property north of Val d'Or, Quebec. The production of lithium carbonate is scheduled to start at the end of this year.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

Increasing labour unrest in the U.S. and elsewhere combined with this week's General Election in the U.K. have reduced activity on the Exchange, and have also caused a general lessening of buying interest everywhere. As would be expected, the prices of the metals have moved within narrow limits, and with the exception of copper, which has been influenced by the outbreak of an additional strike, this time in Chile, prices have, at the best, remained steady.

COPPER CONTINUES STRIKEBOUND

Last weekend, the management and workers at Braden failed to reach agreement and a strike commenced which is causing the loss of some 16,000 tons a month of copper. As was expected, this additional reduction in copper production caused a jump in prices in London as the majority of Braden's shipments come to Europe.

In the U.S., the strike position remains unaltered with some half-hearted attempts being made here and there to reopen negotiations. At the time of writing, however, there seems little hope of any serious get-together. The availability of copper is now becoming less and the customs smelter still in operation has indicated that there is no more copper available for October and November and that the limited quantities for December and January will continue to be sold at 33 c. per lb. It is understood that the warehouse copper, which one of the large producers has been selling at 30 c., is also at an end. Traders have been asking about 34 c. per lb. for November delivery and, owing to the dock strike, quotations for prompt material have been as high as 36½ c. per lb. but it is understood that this price is only being paid by companies finding themselves short of metal to deliver against existing maturing contracts.

There have been various points of view as to the possible effect of the U.S. dock strike, but these are now academic as the President has intervened and work is expected to return to normal by the weekend. This intervention may mean that the President is now more willing to act in the question of the steel strike and, should he do so, a return to work would probably bring an increased demand for copper. It is unlikely that any Presidential action will be taken in the copper strike as this can hardly be classified as a national emergency or fall under any of the definitions necessary for the invocation of the Taft Hartley Act.

In London, the market received an impetus in the upward direction by the Braden strike but throughout the week there has been continuous liquidation of bull positions and on most days this has caused the initial upward movement to be curtailed. It is, however, expected that this selling has almost come to an end and that the price will move up another £5 or so before further selling becomes evident. Stocks in official warehouses showed a fall of 175 tons to 13,063 tons but, with the return of the U.S. dock workers, this figure will probably be very much lower by the end of the month and the backwardation, which has again been established, may widen.

A further complication in the copper picture has been the report of the first organized strike of transport workers in the Belgian Congo and it is not yet known in London whether this will seriously affect the movement of metals to the coast but, should this prove to be the case, the reaction in London may be sharp.

Away from all the turmoil of London and New York, the Mount Isa Mines Ltd., go quietly ahead and their chairman has recently announced that the ore production has increased 35 per cent in the last year, and that the electrolytic refinery at Townsville is now in production with a capacity of 40,000 tons of refined copper a year which should be increased to 60,000 tons by the end of 1960.

TIN FIRMER AGAIN

The weakness in the tin market noted last week was short-lived and has been replaced by a more optimistic undertone which is being helped by the possibility that the steel workers in America will return to work. The market still fluctuates between a small backwardation and a contango and stocks in official warehouses fell a further 256 tons last week to 8,338.

During September, tin shipments from Singapore totalled only 10 tons, whilst those from Penang amounted to 3,277 tons. This latter shows a sharp fall of about 1,500 tons from the tonnage shipped in August but is almost 1,000 tons more than for the corresponding month last year. The Singapore shipments during August totalled 7 tons and those for September last were 368 tons.

On Thursday the Eastern price was equivalent to £810¾ per ton c.i.f. Europe.

LEAD AND ZINC UNCHANGED

The lead and zinc markets remain completely featureless with non-American demand being satisfactory in both metals, whilst reports from the U.S. say that there has been a pick-up in the demand for lead but that the prolonged steel strike is at last having some effect on the demand for zinc. The prices of both metals, however, remain steady at their present levels of 13 c. per lb. for lead and 12 c. per lb. for zinc.

O.E.E.C. countries produced 42,714 tonnes of lead in August as compared with 46,986 tonnes in July. This level of production is about 17 per cent higher than in August, 1958. Zinc production in August totalled 71,975 tons against 69,587 tons and represents an increase of 10 per cent over August, 1958.

The U.S. Bureau of Customs' final report on imports of lead and zinc for the period July 1 to September 30, shows that all the zinc ore quotas were filled whilst for lead ore Peru failed to fill its quota by a small tonnage but imports from "other countries" were little more than one-third of the permitted total: in the metals, all the lead quotas were filled except for a very short deficency in the Peruvian quota but for zinc only Canada, Italy and "other countries" provided the full amount although the short fall in the other figures is only of a very minor nature.

Closing prices are as follows:

	Oct. 1 *Buyers*	*Sellers*	Oct. 8 *Buyers*	*Sellers*
COPPER				
Cash	£228½	£228¾	£232½	£232¾
Three months	£229½	£229¾	£232¾	£233
Settlement	£228¾		£232½	
Week's turnover	9,850 tons		18,350 tons	
LEAD				
Current ½ month	£70	£70½	£70½	£70¾
Three months	£71½	£71¾	£71¾	£71¾
Week's turnover	5,450 tons		4,775 tons	
TIN				
Cash	£793½	£794	£794	£794½
Three months	£794	£794½	£794½	£795
Settlement	£794		£794½	
Week's turnover	435 tons		635 tons	
ZINC				
Current ½ month	£86½	£86½	£87½	£87½
Three months	£85	£85½	£85½	£85½
Week's turnover	3,850 tons		4,900 tons	

London Metal and Ore Prices appear on Inside Back Cover.

Mining Finance

Ashanti's Golden Year

The publication of its mining results for September bring to an end the best year ever for Ashanti. The profit for the month, £139,702, brings total estimated profits for the year to £1,574,984, compared with £1,314,378 in 1957-8, and the previous record of £1,442,480 in 1939-40. This should be ample to ensure the fulfilment of the forecast by the chairman, Maj.-Gen. Sir Edward Spears, that the 1958-9 dividend should equal 1957-8's 2s. in spite of the intervening increase in capital.

The great thing about Ashanti is the consistency of its mineralization. Outside the Rand, most of the world's gold mines operate one or two veins only, with the consequent possibility of a sudden diminution in values. Among multi-reef operators, too, it is the rule rather than the exception to find values diminishing with depth. At Ashanti, on the other hand, the many payable reefs have been followed both vertically and horizontally without the slightest signs of any but local declines in value. Indeed, in the area around the Eaton-Turner shaft, fully commissioned in March of this year, indications are that the grade of the ore is actually improving with depth. Obviously this cannot go on for ever; Ashanti, however, is so well-behaved that the company has expressed its confidence by sinking about £4,500,000 into its development and rehabilitation since the war. In any event Ashanti's reserves, which are more than five years ahead of the mill (and still considered inadequate by the board), provide an extremely soft cushion.

The surprising thing about Ashanti remains the cheapness of its market quotation. Currently, Ashanti shares can be bought around 23s., the 1959 high, to yield 8½ per cent. For those who are prepared to take the Ghana Government's words and deeds at their face value (and there is no reason to do otherwise) this represents one of the best buys in the mining markets.

RICH DRILL AT W. HOLDINGS

Borehole F.H.2, drilled for geological information some 6,000 ft. W.N.W. of Western Holdings' No. 1 shaft, has intersected a value of 2,414 in.dwt. on the Basal Reef at a depth of 3,806 ft. Core recovery was complete.

One of the objects of this borehole was presumably to see whether or not the enriched zone or zones of the common boundary area extend as far west in the Western Holdings property as they appear to in Free State Geduld. One borehole is never conclusive proof of anything, of course, but on balance, the evidence now seems to point to the probability of enriched ore extending over much of the Western Holdings "enclave" between beacons G.D.1 and R.D.1, an area of some 150 claims. The eastern extremity of this area could already be assumed to be rich, on the basis both of the Geduld 1 borehole and of development on 36 and 38 levels.

LONDON MARKET HIGHLIGHTS

This past week, South African gold shares have once again provided one of the see-saw movements which seem to be a feature of the Mining market these days. At the beginning of the week prices continued to be in fine fettle. It was true that business was still small, but this resulted from a shortage of stock in many of the popular issues and the Cape continued to send over plenty of buying orders.

The newer mines were again sought after on Monday, Free State Geduld, for instance, rose 1s. 10½d. to 181s. 10½d. and, still influenced by the encouraging borehole news, Western Holdings gained 2s. 6d. more to 170s. 7½d. In the Finance group, Union Corporation advanced another 2s. 6d. to 75s., buyers being inspired by the hope that the flotation of the new Bracken and Leslie mines in the Kinross area will be coming soon.

But on Tuesday prices went into reverse. Maturing time bargains in Johannesburg were blamed for the move which lowered Free State Geduld to 178s. 1½d., Western Holdings to 167s. 6d. and Union Corporation to 74s. 6d.

Wednesday saw the market regain its earlier firmness with a revival of Cape and U.S. demand. As a result, Free State Geduld recovered to 180s., Western Holdings to 170s. and Union Corporation to 75s. 6d. U.S. buying was held responsible for a rise of 1s. to a seven-year peak of 15s. in Libanon and a four-year record of 29s. 6d. in Blyvoor. On that day also the Industrial market seemed to have made up its mind at last that the General Election would result in a Conservative victory and prices of most equities moved up strongly.

Meanwhile, interest revived to some extent in the Copper share market in front of the pending batch of final dividends from Roan, R.S.T., "Rhoanglo" and Rhokana. "Tanks" (47s. 3d.) eased for a while on news of the Belgian Congo railway strike, but brightened later when it was learned that the company's Benguela Railway was unaffected by the stoppage.

Tin shares seemed consistently firm, although business was not particularly brisk. The East was often a buyer of its favourite stocks and seemed particularly interested in Kinta (25s.). There was not a great deal going on in the Lead-zinc sections apart from a sudden resumption of Australian support for Mount Isa. The shares consequently spurted 4s. to 49s. 9d. before reacting to 49s. 3d.

As usual West African golds were largely swayed by the movements of the Kaffir market. Ashanti Goldfields, however, steered an upward course of their own during which the shares reached 23s. 7½d. This stemmed from the record profit earned for the year to September 30, and the fairly obvious inference that still better things are to come from this important Ghana gold mine. Elsewhere, the record gem sales made in the September quarter raised De Beers to 173s. 9d.

By the time that these notes appear in print the result of the General Election will be known. Initially, a Labour victory will have a sharply depressing effect on the Industrial share market. These securities may also suffer from some profit-taking following a Conservative win. As for Mining shares, a Labour Government might signal a good deal of hedge buying. But a continuation of Conservative policies may not have much effect on mining share prices either way.

DIAMOND SALES STILL IMPROVING

Diamond sales for the three months to September 30 continued their strong recovery from the low point reached 15 months ago. Gem sales, at £16,891,253, were a new record, and with industrial sales of £6,317,036, the total reached £23,208,289, £1,600,000 higher than in the June three months.

The following table summarizes sales in the last seven three-month periods.

Period	Gems (£000,000)	Industrial (£000,000)	Total (£000,000)
1958			
March Qtr. ...	10.5	4.8	15.3
June Qtr. ...	10.7	3.2	13.9
Sept. Qtr. ...	12.8	3.2	16.1
Dec. Qtr. ...	15.3	4.9	20.2
1958 Total ...	49.4	16.1	65.5
1959			
March Qtr. ...	15.9	7.7	23.6
June Qtr. ...	14.8	6.8	21.6
Sept. Qtr. ...	16.9	6.3	23.2

Speaking at the Rotary Club of London this week, Mr. Harry Oppenheimer, De Beers chairman, said that unless big new diamond deposits were discovered, there might well be a shortage of newly-mined stones in 20-25 years' time. This possibility has obviously played its part in De Beers' recent emphasis in building up its operations in fields outside the diamond industry.

RAND AND O.F.S. RETURNS FOR OCTOBER

Many profit records were again broken by South African gold mines in September. At Vaal Reefs, for example, where a new world shaft-sinking record was set up, an improvement in throughput to 100,000 tons enabled overall profits to rise to £388,390, £23,365 up on the August figure. Even more outstanding was West Drie's advance of £35,303 to £812,231, which resulted from an increase in crushings to 102,000 tons, another record.

Similarly good results were achieved in the O.F.S. Free State Geduld continued its advance, earning a record £591,577. President Brand was another record breaker, the overall £924,087 being another £9,000 on the way to fulfilling its chairman's forecast that it would be the world's first gold mine to earn profits of £1,000,000 per month.

At St. Helena, the grade increased by a further small amount and profits responded to the extent of £8,300, reaching £296,800, yet another record. Western

Holdings, too, topped its previous high, an improved grade hoisting profits to £679,685.

Harmony, on the other hand, was able to put only 138,000 tons through the mill, 2,000 tons less than in August, and with costs rising by 2s. per ton, the fall in profit to £443,009 from £446,457 was not surprising. With costs up and grade down, Harties was another property where the September results were not up to the preceding month's standard.

Among the older producers, E.R.P.M. suffered a setback in profit (£110,898 against £123,137) while an accident at Vogelstruisbult No. 1 shaft caused a slight decline in throughput.

The continued high level of crushings at the South African mines will lend interest to the imminent publication of current labour strengths. At this time of the year, complements are normally beginning their seasonal decline. It remains to be seen whether this is less marked this year (as was the case in 1958) on whether the advance development made possible by the excellent labour position earlier this year is now having its effect on mill tonnages.

Kalgoorlie Southern — Third Call.—A third call of 1s. per share (Australian currency) on Kalgoorlie Southern Gold Mines' 1954 issue of 5s. shares has been made due on October 14.

Springs and Brakpan to Repay 6d.—Springs and Brakpan, two of the declining mines of the Anglo American group, are to make capital repayments of 6d. each. These repayments are subject to shareholders' approval of the resolutions reducing the nominal value of the shares to 3d., which will be put at forthcoming extraordinary meetings.

British and Rhodesian Discount House.—The full list of companies backing the new British and Rhodesian Discount House has now been released. Apart from Anglo American and Smith St. Aubyn, the companies concerned are: Barclays D.C.O., Prudential Assurance, South African Mutual Life Assurance, Standard Bank of South Africa, Tanganyika Concessions, and one of the investment subsidiaries of the British South Africa Company.

North Broken Hill Results.—Compared with a surplus of £513,000 in 1957-8, North Broken Hill improved its earnings in the year to June 30, 1959, to £1,116,000. A final dividend of 3s. per share has been declared payable on December 2, making 5s. 6d. for the year. The corresponding dividend last year was 2s. 6d. which followed an interim of 2s.

Anglo Converts German Loan.—Last Thursday, Anglo American Corporation exercised its option to convert its £4,200,000 loan to De Beers into De Beers deferred shares at 120s. per share (currently valued in the market at 173s.). The loan was raised by Anglo last year in Germany, and passed on to De Beers to facilitate the purchase of Williamson Diamonds. Quotation for and permission to deal in the 700,000 new shares is being sought in London, Johannesburg and Salisbury.

Natal Coal Exploration.—Natal Coal Exploration announces that Vereeniging Estates has subscribed for 200,000 5s. shares of Natal Coal Exploration at a price of 8s. 6d. Of the proceeds, £48,000 has been used to repay an earlier loan from Vereeniging Estates, while the remaining £27,000 is being retained against future capital requirements.

Rand and Orange Free State Returns for September

GOLD OUTPUT AND PROFIT

Company	September 1959 Tons (000)	Yield (oz.)	Profit† (£000)	Year ends	Current Financial Year Total to date Tons (000)	Yield (oz.)	Profit† (£000)	Last Financial Year Total to date Tons (000)	Yield (oz.)	Profit† (£000)
Gold Fields										
Doornfontein	95	38,565	192·7	J	284	115,247	570·1	262	109,427	571·1
Libanon	110	25,734	61·4	J	327	76,558	180·2	294	69,056	164·1
Luipaards Vlei	73	13,021	5·9	J	219	38,564	17·4	210	36,127	15·7
Rietfontein	16	4,302	8·2	D	144	38,056	67·4	196	44,726	113·4
Robinson	56	11,107	0·4	D	526	110,680	L70·4	650	138,241	28·4
Simmer & Jack	82	16,528	8·7	D	775	147,318	L39·7	789	150,794	127·3
Sub Nigel	66	15,744	21·3	J	198	47,403	66·2	198	48,097	78·0
Venterspost	126	31,721	61·2	J	385	96,212	184·3	391	96,491	181·8
Vlakfontein	52	18,617	88·7	D	455	163,434	772·8	446	157,401	763·1
Vogels	88	19,932	29·4	D	824	185,097	328·2	860	192,486	394·8
West Drie	102	93,391	787·4	J	298	272,621	2272·3	240	229,073	1876·3
Anglo American										
Brakpan	138	17,027	12·0	D	1,247	150,972	101·0	1,115	148,612	108·7
Daggas	244	48,265	231·5	D	2,163	435,316	2131·0	2,087	433,751	2273·0
East Daggas	104	17,628	40·0	D	900	150,504	298·5	822	136,171	254·0
F.S. Geduld	93	76,392	591·6	S	972	759,710	5662·0	803	575,570	3990·7
President Brand	120	98,406	879·3	S	1,267	993,362	8675·7	989	736,663	6002·2
President Steyn	104	41,310	201·9	S	1,190	463,233	2328·8	1,144	471,263	2439·3
S. A. Lands	98	20,433	56·6	D	870	181,871	513·0	804	174,959	475·2
Springs	105	14,384	15·3	D	936	128,158	115·1	1,144	128,929	78·0
Vaal Reefs	100	45,000	237·6	D	798	360,437	1901·5	647	291,779	1652·2
Welkom	100	31,251	83·8	S	1,149	352,132	956·5	1,029	304,530	850·6
Western Holdings	137	85,627	679·7	S	1,387	838,419	6454·5	1,169	633,651	5393·0
West. Reefs. Ex.	142	37,498	119·7	D	1,169	306,117	913·2	1,007	238,181	573·4
Central Mining										
Blyvoor	127	84,456	645·6	J	393	254,686	1920·3	310	200,472	1451·5
City Deep	114	23,488	8·1	D	1,039	216,118	87·7	1,172	229,907	90·7
Cons. M. R.	90	17,842	7·1	J	304	56,469	24·5	395	61,940	40·7
Crown	221	35,185	19·2	D	1,992	315,758	117·7	2,069	314,749	139·4
D. Roodepoort	194	35,660	52·5	D	1,716	317,229	481·4	1,636	295,878	458·5
East Rand Prop.	210	56,230	110·9	D	1,991	517,196	1082·5	1,909	509,217	1322·0
Harmony	138	54,863	244·9	J	425	167,903	766·5	277	109,529	419·8
Modder East	137	13,281	2·7	J	426	40,809	8·9	412	40,181	5·5
Rose Deep	34	5,652	L1·4	D	353	47,826	L1·0	502	65,196	L23·4
J.C.I.*										
Freddies Cons.	61	14,587	L37·5	D	530	127,811	L334·4	471	136,077	L351·1
Govt. G.M.A.	52	10,706	0·9	D	480	96,164	L12·6	562	100,055	8·0
Randfontein	38	6,020	5·2	D	323	55,423	79·0	252	39,864	45·7
Union Corporation										
East Geduld	143	42,186	287·0	D	1,245	373,263	2513·9	1,151	353,976	2417·2
Geduld Prop.	75	14,367	38·8	D	657	123,770	247·8	707	115,215	94·4
Grootvlei	225	47,026	253·2	D	1,905	402,455	2072·9	1,770	376,800	1918·5
Marievale	97	23,436	119·6	D	847	208,401	1022·0	647	169,589	751·6
St. Helena	160	50,403	296·8	D	1,350	410,129	2247·4	1,065	312,490	1578·4
Van Dyk	73	14,004	35·3	D	678	127,952	250·1	687	126,249	223·8
Winkelhaak	80	21,809	69·6	D	677	169,673	371·1	—	—	—
General Mining										
Buffelsfontein	144	54,754	286·5	J	432	164,030	855·1	355	119,616	552·0
Ellaton	30	6,996	27·3	D	281	65,250	262·2	288	66,896	285·4
S. Roodepoort	30	7,088	22·9	J	90	21,455	68·6	90	21,255	73·3
Stilfontein	159	71,600	400·2	D	1,274	614,774	3689·0	1,025	508,073	3283·3
W. Rand Cons.	139	20,066	10·9	D	1,236	179,359	162·8	1,249	164,813	129·6
Anglo Transvaal										
Hartebeestfontein	91	48,230	307·5	J	270	144,435	936·0	261	142,680	944·3
Loraine	82	16,194	L19·9	S	928	181,291	L228·9	813	154,260	L237·8
N. Klerksdorp	11	1,258	L6·1	D	93	10,067	L77·9	91	9,890	L69·7
Rand Leases	191	28,366	28·0	J	585	86,283	86·1	535	78,193	29·0
Village M.R.	30	4,769	1·2	J	86	14,126	3·4	82	13,871	L0·5
Virginia O.F.S.	132	30,360	12·7	J	400	92,502	37·9	325	84,945	138·4
Others										
N. Kleinfontein	81	10,814	3·1	D	743	96,687	27·9	793	96,141	L27·7
Wit. Nigel	18	4,383	5·3	J	54	13,144	15·5	54	13,052	19·9

Gold has been valued at September, 250s. 0d. (August 249s. 4d.) per oz. fine. L indicates loss. †Working Profit *Working Profit includes sundry revenue. Table excludes profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.

ESTIMATED URANIUM REVENUE

Company	Year ends	Sept. Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)	Company	Year ends	Sept. Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)
Goldfields					**J.C.I.**				
Doornfontein	J	15·0	43·0	45·0	E. Champ d'Or (*b*)	D	7·1*	61·3*	54·3*
Luipaards Vlei(*a*)	J	94·0	279·0	268·0	Freddies Cons.	D	37·0*	315·0*	251·0*
Vogels	D	54·0	471·0	480·0	Govt. G.M.A.	D	22·6*	199·0*	219·2*
West Drie	J	50·0	150·0	138·0	Randfontein (*a*)	D	110·5*	958·3*	991·7*
Anglo American					**General Mining**				
Daggas	D	142·8	1244·3	1262·0	Buffelsfontein	J	210·0	636·0	571·0
President Brand	S	44·8	548·7	515·0	Ellaton	D	18·0	163·0	142·0
President Steyn	S	58·6	716·5	687·0	Stilfontein	D	86·0	771·0	817·0
Vaal Reefs	D	150·8	1283·6	1087·0	W. Rand Cons. (*a*)	D	209·5	1811·2	2031·3
Welkom	S	56·1	681·4	645·0					
West. Reefs Ex.	D	160·3	1429·7	1372·0	**Anglo Transvaal**				
					Hartebeestfontein	J	265·0	796·6	801·6
Central Mining					Loraine	S	36·0	416·0	396·0
Blyvoor	J	153·0	456·4	482·6	N. Klerksdorp	D	11·0	98·5	108·0
Harmony	J	198·1	599·3	387·3	Virginia O.F.S.	J	175·5	528·2	558·6

Table includes profit from uranium, acid and pyrite before loan redemption. (*a*) Total profit from uranium section. (*b*) Overall profit. *Net revenue after provision for loan redemption.

GOLD MINES OF KALGOORLIE (AUST.)

The annual general meeting of Gold Mines of Kalgoorlie (Aust.) Limited was held on September 7 in Melbourne.

Mr. G. Lindesay Clark, B.Sc., M.M.E. (the Chairman), presided.

(All figures quoted are in Australian currency.)

Net profit for the year was £248,686 compared with £309,477 for 1957/58, a reduction of £60,971. The previous year's figure, however, included £38,456 Gold Subsidy received on account of 1956/57 production, part of which was in respect of gold locked up in pyritic concentrates stacked at Fremantle at the close of that year realized during 1957/58, and the balance a refund of a reduction in 1956/1957 subsidy because of the profit limitation sections of the Gold Mining Industry Assistance Act.

The current year's results are after charging £28,221 cost of repairing the damage caused by the subsidence in the Perseverance Shaft area. After allowing for these two factors, profit earned during the year exceeded that of last year by £5,706.

A dividend of 10½d. per share absorbing £176,107 was paid on December 4, 1958. This was an increase of 1½d. on the previous year's dividend of 9d.

The mill averaged 39,400 tons per four-weekly period and treated a total of 531,959 tons for the year. Gold recovery amounted to 142,584 fine ounces including 9,478 ounces of gold in the concentrates produced and, from the clean-up of shut-down mills, an additional 761 ounces was obtained.

The average costs of mining and treatment of ore from Kalgoorlie and Coolgardie of 73.5/- per ton were the same as those of last year, a reduction of 1.6/- per ton in treatment costs being offset by a similar increase in cost of ore mined. Development redemption at 9.5/- per ton showed a decrease of 0.4/-.

Modifications to the arrangements for hoisting ore from underground have resulted, since the closing of the year, in a saving of approximately 1.8/- per ton.

Perseverance Lease. The Perseverance Shaft, reconditioned and converted to skip haulage, was recommissioned in May, 1959. Many old open stopes were filled following the April, 1958, surface subsidence and further filling will be required over the next few years.

Ore reserves at March 31, 1959, were estimated at 1,277,000 tons averaging 5.7 dwts. per ton.

Kalgoorlie Development. Last year 23% was in ore averaging 10.5 dwts. over 67 inches. This year work to mid August has averaged 21% in ore averaging 10.0 dwts. over 66 inches.

Much currently developed ore is from lodes in the quartz dolerite which have been accessible for many years: the future ore potential of this zone is substantial. The longer term potential is from the underlying calc schist in which many known ore shoots exist. In this zone Gold Mines of Kalgoorlie prospecting has so far been limited: current calc schist developments north in the Paringa and deep in the Enterprise sections have been encouraging.

Coolgardie. At Bayleys Mine, Coolgardie, the high grade ore shoot exposed last year in Prices Reef at No. 10 Level is now developed at Nos. 8 and 9 Levels. Two further shoots were exposed at No. 8 Level, one of which has also been exposed on No. 6 Level. Enriched patches carrying coarse free gold are characteristic of all these shoots.

The report and accounts were adopted.

WESTERN MINING CORPORATION

The annual general meeting of Western Mining Corporation Limited was held on September 18 in Melbourne.

Mr. G. Lindesay Clark, B.Sc., M.M.E. (the Chairman), presided.

(All figures quoted are in Australian currency.)

Net profit for the year of £308,444 was £48,474 greater than for 1957/58. The increase was principally attributable to higher dividends received from our holdings in Central Norseman Gold Corporation No Liability and Gold Mines of Kalgoorlie (Aust.) Limited of 3/6d. and 10½d. per share respectively compared with 3/- and 9d. per share last year.

Dividends totalling 1/- per share were paid by the Corporation during the year, and since the close of the year the usual 6d. half-yearly dividend was paid on August 14.

Reviewing the Corporations's various interests, the Chairman said:

Western Aluminium No Liability: This Company was formed last year to take over bauxite and coal prospecting reservations from Western Mining Corporation and Champagne Syndicate respectively, and to carry on exploration for bauxite and coal on these reservations in the Darling Ranges.

Drilling of the extensive areas showing bauxite has begun. The drilling is proceeding very satisfactorily but the area to to covered is so large that much time must elapse before any conclusions can be reached.

Geophysical prospecting of the Company's coal reserves has shown that the known Wilga Coal Basin, included in the Company's Reserves, is smaller than had been recognized previously.

Copper Prospect W.A.: Exploration at Tarraji, north west Western Australia disclosed a number of areas showing some copper mineralization.

The Western Australian group of companies treated 1,200,063 tons of ore from which 333,500 ounces of fine gold in bullion and concentrates were produced.

After reviewing the results and prospects of the operating companies, the Chairman, in referring to the persistent drain of gold from the United States, stated that this reflected no basic weakness of the dollar, but rather an improvement in monetary conditions elsewhere. That did not lessen the inadequacy of international reserves which would be improved by an increase in gold price. However, no such rise appeared imminent.

Company Policy

The Board's policy must be influenced by the outlook for the future of gold. In respect of our gold interests while we may perhaps hope gradually to improve our standards of performance, we must recognize that our overall economic position will tend to become less favourable with any rise in the cost level. In our operating mines we will endeavour to keep in the forefront of mining progress by bringing into use all suitable modern equipment and by expanding output while maintaining active search for orebodies in and around the mines.

To supplement gold mining and gradually replace it if economics so require, exploration is being extended to other metals. To spread risks, share expenditure and increase the prospects of success, joint ventures with other mining houses are being entered into where appropriate.

The report and accounts were adopted.

KALGOORLIE SOUTHERN GOLD MINES NO LIABILITY

The annual general meeting of Kalgoorlie Southern Gold Mines No Liability was held on September 8 in Melbourne.

Mr. G. Lindesay Clark, B.Sc., M.M.E. (the Chairman), presided.

(All figures quoted are in Australian currency.)

Expenditure during the year on diamond drilling, geological work, lease rents and administration amounted to £8,802 and has been charged to Mine Development. Plant and stores absorbed £8,332 the major part of which represented purchase of heavy duty rods for deep drilling.

All of these items, totalling £17,134, were financed from funds on hand at the end of the last financial year which at balance date stood at approximately £12,000.

Current drilling of the new deep hole, S.E.11, with the present drill has now substantially reduced these funds and it will be necessary to finance the completion of Hole S.E.11 and also the cost of the new drill.

Geophysical work and shallow drilling has confirmed a second syncline south of the Cavalier syncline and a strong pitch reversal of the structure in the Company's leases. This must involve severe distortion and shearing of the rocks, a necessary prerequisite for major ore deposition.

The Company's highly speculative project is the attempt to find a great prize—a southern repetition of the Kalgoorlie gold field.

It has succeeded with its first objective by locating two synclinal structures in which ore could occur. The first—the Cavalier syncline—is comparable to the Kalgoorlie syncline and drilling has shown mineralization with some gold. The second more southerly structure is shallower and untested.

The next holes — to test the eastern limb of the Cavalier syncline and the second structure — will be the critical tests of this venture.

The report and accounts were adopted.

(Since the date of the Annual Meeting, a Call (The Third) of 1/- per share, payable on October 14, 1959, has been announced, making the contributing shares called to 4/- per share.)